WHAT IS CLAIMED IS:

1. A magnetocaloric refrigeration device for use in a controllable magnetic field, comprising a heat release/absorption module,

wherein the heat release/absorption module comprising:

a magnetocaloric working unit made of a magnetocaloric material, wherein the temperature of the magnetocaloric working unit changes as the magnetic field is alternately applied and removed; and

at least one heat pipe having an evaporation portion and a condensation portion, wherein at least one of the evaporation and condensation portions is connected to the magnetocaloric working unit such that heat is transferred from the evaporation portion to the condensation portion by a working medium contained in the heat pipe responsive to the temperature change of the magnetocaloric working unit.

2. The magnetocaloric refrigeration device of claim 1, wherein the heat pipe is a one-way heat transfer element.

3. The magnetocaloric refrigeration device of claim 1, wherein the heat pipe is attached to an external surface of the magnetocaloric working unit.

4. The magnetocaloric refrigeration device of claim 1, wherein the heat pipe is inserted in the magnetocaloric working unit.

5. The magnetocaloric refrigeration device of claim 1, wherein if the heat release/absorption module has only one heat pipe, the evaporation and condensation portions of the heat pipe are both connected to the heat release/absorption module for heat release and heat absorption.

6. The magnetocaloric refrigeration device of claim 5, wherein the condensation portion of the heat pipe has an externally exposed heat release extension formed through a top of the magnetocaloric working unit, and the evaporation portion thereof has an externally exposed heat absorption extension formed through a bottom of the

magnetocaloric working unit.

7. The magnetocaloric refrigeration device of claim 1, wherein if the heat release/absorption module has at least two heat pipes, the heat pipes are respectively a heat releasing pipe mounted on the magnetocaloric working unit via the evaporation portion thereof, and a heat absorbing pipe mounted on the magnetocaloric working unit via the condensation portion thereof.

8. The magnetocaloric refrigeration device of claim 7, wherein the condensation portion of the heat releasing pipe has an externally exposed heat release extension formed through a top of the magnetocaloric working unit, and the evaporation portion of the heat absorbing pipe has an externally exposed heat absorption extension formed through a bottom of the magnetocaloric working unit.

9. The magnetocaloric refrigeration device of claim 1, wherein the heat release extensions of the heat releasing pipes are spaced from or communicative with each other.

10. The magnetocaloric refrigeration device of claim 1, wherein the heat absorption extensions of the heat absorbing pipes are spaced from or communicative with each other.

11. The magnetocaloric refrigeration device of claim 1, wherein a wick structure is formed on an inner wall of the heat pipe.

12. The magnetocaloric refrigeration device of claim 1, wherein an inner wall of the heat pipe is bare and featureless.

13. The magnetocaloric refrigeration device of claim 1, wherein the magnetocaloric material is composed of Gd, Si and Ge in a relation of $Gd_5(Si_xGe_{1-x})_4$.

14. The magnetocaloric refrigeration device of claim 1, wherein the magnetocaloric working unit is filled with powders of the magnetocaloric material.

15. The magnetocaloric refrigeration device of claim 1, wherein the

magnetocaloric working unit is made of an alloy film formed from a deposition of the magnetocaloric material.

16. The magnetocaloric refrigeration device of claim 1, wherein a plurality of resin layers are formed in the magnetocaloric working unit for partitioning the magnetocaloric material.

17. The magnetocaloric refrigeration device of claim 1, wherein the controllable magnetic field is formed by a stationary electromagnet that alternately magnetizes and demagnetizes.

18. The magnetocaloric refrigeration device of claim 1, wherein the controllable magnetic field is formed by a stationary superconductive magnet that alternately magnetizes and demagnetizes.

19. The magnetocaloric refrigeration device of claim 1, wherein the controllable magnetic field is formed by a movable permanent magnet.

20. The magnetocaloric refrigeration device of claim 1, further comprising a heat exchanger through which the working medium transfers the heat so as to form a magnetic refrigerator.